MUSIC AS A PRIOR CONDITION TO TASK PERFORMANCE

BY

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This work is dedicated to my mother, Gertrude Fulton Gregoire, and to my father, the late Robert Henry Gregoire.

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MUSIC AS A PRIOR CONDITION TO TASK PERFORMANCE

By

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The purpose of the study was to examine the relationship between a passive music-listening activity, designed to facilitate concentration and relaxation, and subsequent performance of a specific classroom task, matching numbers. Seventeen trainable mentally retarded (TMR) students, 6 to 11 years of age, in two primary self-contained classes were utilized in which both groups of students received treatment and control conditions over a 2-week period consisting of six sessions. Group P (the older students) received the control condition over the first three sessions, while Group C (the younger students) received the experimental treatment. Conditions were reversed for both classes in sessions four through six.

Experimental conditions consisted of a brief taped story (1 minute 45 seconds) illustrated on a felt board with

characters and scenes from the story, a 5 minute 26 second rest period paired with a relaxing music selection, and 5 minutes of individual number matching at the students' seats. Control conditions were identical except the music was deleted so the rest period occurred without any music stimulus provided. The music used was a South American ballad, 5 minutes 26 seconds in duration, played on a solo Paraguayan harp.

The dependent variable for the study was matching numbers from 1 to 20. Measurement was in rate of correct response within a 5-minute independent work period occurring immediately after the rest period. Additionally, teacher and aide reactions to the study were obtained, and relaxing effects of the music selection were assessed.

Data were analyzed by paired *t*-tests. Results were not significant for number-matching comparisons for Group P; Group C exhibited a significant increase in correct number-matching rates in Control session 3 compared with Experimental session 3. The older group of students exhibited significantly less behavior during the music-rest than during the rest phase, indicating that the music may have been relaxing to those students. Teachers generally felt sedative music (such as the selection used) was helpful during student rest times in class and indicated they would continue to use music during rest periods. Further research was recommended.

CHAPTER 1
INTRODUCTION TO THE PROBLEM

Introduction

At the First World Congress on Future Special Education, music was described as a potential "lever of learning" (Mahler, 1978). It was suggested that the concepts of music in special education must be expanded if the potential is to be realized. Alley (1977) has stated that music can meet certain mainstreaming needs because of its qualities, and because it is perceived as a normalized, high-valued activity. Mahler concurs, believing that Individualized Education Plans (IEPs) of the future will contain music as a vehicle for teaching a variety of skills and subjects.

Music has unique characteristics which make it a powerful learning tool for special students (Alley, 1977). The lack of specific academic content area allows adaptability to any skill or academic instruction. Music has inherent stimulating and reinforcing aspects, giving it a valued quality for behavior management in the classroom setting. As a teaching vehicle in special education, music is typically applied within a behavior management or instructional framework, resulting in observable student responses. Music has been successfully used as a positive reinforcer for

academic responses, such as correct performance of math problems (Cotter & Spradlin, 1971; Dorow, 1976; Miller, 1977), and to increase appropriate social behavior and decrease inappropriate behavior in the classroom and ancillary school environments (Jorgenson, 1974; McCarty, McElfresh, Rice, & Wilson, 1978; Wilson, 1976; Wilson & Hopkins, 1973). Music has been contingently applied to encourage imitation (Dorow, 1975; Metzler, 1974; Underhill & Harris, 1974), and to increase work production (Cotter, 1971). Background music as it affects activity level, including attention and distraction to tasks (Podvin, 1967; Rearson & Bell, 1970; Rieber, 1965; Scott, 1970; Windwer, 1981; Wolfe, 1982), learning (Schuster & Vincent, 1980; Stainback, Stainback, & Hallahan, 1973), and stereotypic or self-stimulatory behavior (Greenwald, 1978; Stevens, 1971; Tierney, McGuire, & Walton, 1978) has been studied.

A structured and judicious use of music in the instructional setting can enhance students' learning in a variety of ways. Usually the mechanism is one of motivation and stimulation. Appropriate music can also be provided during the quiet or rest time in the school day to facilitate the passive mood of respite suggested by those times. Thus, music may assist with relaxation.

Relaxation

Relaxation techniques applied in the classroom have been suggested for helping the mentally retarded with self-control, behavior difficulties, and specific academic

problems, as well as coping with daily stress (Harvey, 1979). Some success has been reported with deep muscle relaxation in managing hyperkinesis (Bhatara, Arnold, Lorance, & Gupta, 1970), in anxiety reduction (Harvey, 1979), and in improving handwriting quality (Carter & Synolds, 1974). Transcendental meditation has been suggested, although not evaluated, as a relaxation technique which could be applied in special education (Ferguson, 1976).

Biofeedback is also used as a relaxation technique. The primary effect of biofeedback training is a more positive self-image, according to Walton (1979), which develops as the individual gains control over his or her physiological reactions. Walton also reported that some researchers have found an increase in the capabilities to concentrate, attend, and respond cognitively resulting from biofeedback training. Biofeedback-induced relaxation technique has been modestly effective in relaxing hyperactive adolescent boys, when a taped relaxation program was included (Omizo, 1980).

Suggestive-Accelerative Learning and Teaching (S.A.L.T.)

Relaxation techniques can be paired with other types of relaxation-inducing stimuli to enhance learning in the classroom setting. The Suggestive-Accelerative Learning and Teaching method, developed by Hungarian Georgi Lozanov, utilizes relaxation, baroque or classical music, and dramatic presentation of subject material by the teacher to facilitate rapid learning. Recently, the S.A.L.T. method

was demonstrated to be successful in teaching math and reading to learning-disabled students (Schuster & Vincent, 1980).

S.A.L.T. sessions alternate between active and passive presentation of material to be learned, with the passive sessions incorporating music. Baroque period music (from 1600 to 1750) in 4/4 time, and having a melody that contributes to relaxation and meditation, is recommended for best results (Pritchard & Taylor, 1980). The teacher presents material orally with the music as background, after which the students continue to relax and listen to the music. Exercises to facilitate relaxation and learning may also include rhythmic breathing coordinated with words to be learned. The method was originally developed for use in teaching foreign languages; however, its use has spread considerably to teaching other subjects, and to teaching disadvantaged students.

There are many implications for the use of music with exceptional students in the special education classroom. The range of possibilities for applying music to the learning goals of these students is yet to be exhausted. As the educational programs are individualized to meet specific student needs, music should be thoroughly studied as a potential medium through which individual needs might be achieved.

The possibility exists that appropriate music, as a prior condition, might influence behavior or task performance, although it has not been specifically addressed in the research. Reports of studies on preschool environments have indicated that preceding activities affect children's attending in subsequent activities (Rogers-Warren & Wedel, 1978). Appropriately scheduled active or passive activities can function as well as contingency management systems in controlling behavior. Fredericksen and Fredericksen (1977) report on a study by Krantz and Risley who found that kindergarten children attended better to the teacher during academic sessions that occurred after a rest period than after a vigorous play period. Reinforcement programs consisting of praise and privileges were found to have similar effects (Krantz & Risley, cited in Rogers-Warren & Wedel, 1978).

The scheduling of an antecedent passive, i.e. quiet music listening, session may well add to the possibilities for types of behavior management and contingency programs that can be applied in the classroom. Increased attention of the children and decreased disruptions should result in better academic and other school task performance.

Motivation can be a problem in teaching the trainable mentally retarded (TMR) individual. Litton (1978) suggests that they cannot be motivated to learn, but can be stimulated and rewarded by variation in activities, enthusiasm of the teacher, and use of positive rewards. Materials with

aesthetic value and activities that involve the various senses are recommended to add incentive to learn. Because of its stimulating and reinforcing qualities and its adaptability to diverse academic content areas, music can serve as a motivator with the TMR. Fredericksen and Fredericksen (1977) observed that alternating active and passive classroom activities and tasks can serve a behavior management function; thus, it would seem that active and/or passive music sessions may be scheduled to students' advantage in the classroom.

Relaxation training for the mentally retarded can be taught in the classroom (Harvey, 1979). Because of lower verbal capabilities of the trainable mentally retarded, nonverbal therapeutic modalities are of particular value in relaxation training. Passive music listening, to sedative, calming selections, should provide the incentive Harvey indicates the mentally retarded need for motivation to participate in relaxation training. The music should also provide the means for facilitating a state of relaxation in the retarded.

Borling (1981) found a significant improvement in performance of the Maze Tracing Speed Test in college students after listening to a sedative (calming) music selection, compared to a stimulating music selection. His study is the only one that has specifically looked at music and alpha brainwave production, as an antecedent event to a mental task performance. Borling's findings are significant to

the purpose and objective of the proposed study in that improved performance resulted from a prior sedative music-listening session.

Noise and its effects on ongoing and subsequent behavior have been studied (Donnerstein & Wilson, 1976). Noise can be considered a disturbing or distressing auditory stimulus, whereas music is not perceived as noise unless the volume is excessive or it distracts the individual from some other focus of attention. The consequences of noise are particularly distressing when an individual has no control over the source of the noise. Glass and Singer (1972) note that behavior subsequent to aversive noise includes impaired task performance and a lower frustration threshold. It appears important, then, to determine whether or not sedative music of a non-disruptive nature might be considered as having the opposite after-effects of noise, i.e. improved concentration and resulting task performance.

Statement of the Problem

The problem investigated in the present study is the influence of music as a prior condition on a focused attention classroom task. There is one fundamental question related to the problem: Does a short period of music-facilitated relaxation affect performance of an immediately subsequent task requiring focused attention, in trainable mentally retarded (TMR) students?

The question of music as an antecedent event affecting behavior subsequent to its presentation is important to investigate for several reasons. First, the study will provide data on the question of whether a structured session of passive music listening affects quality and/or quantity of performance of the next immediate task. Second, it will be one of the first studies to address the overall question of the relationship of music as a prior event to subsequent events; specifically it will address the problem applied to a population not previously considered to any extent in research on effects of music-listening experiences. Third, the study will provide information that can be readily applied, and will be potentially useful to the special education teacher, in curriculum planning. The study may have specific implications for classroom scheduling of learning activities for the TMR students. Finally, the study may provide information that will expand the possibilities for the educational uses of music, aside from music education. At present, music in educational settings is generally applied as a) contingent reinforcement for desired responses, b) a vehicle for teaching specific information, c) background to various daily activities, and d) a leisure-time pursuit.

Purpose and Objective

The purpose of the study is to examine the relationship between a passive music-listening activity, designed

to facilitate concentration and relaxation, and subsequent performance of a specific classroom task, in this case, matching numbers. The objective of the study is to determine whether passive music listening will improve subsequent task performance in the classroom setting, by TMR students.

Definition of Terms

Focused Attention is a state of active alertness induced by work tasks (Borling, 1981); it is the act of concentrating on and performing the task attended to.

Passive Listening is listening to music in a quiet restful manner; no active participation (i.e. talking, moving, singing, etc.) is desired or appropriate on the part of the listener.

Relaxation is a condition of restful quiet identified by an absence of motor movement and vocalizations. According to Jacobson (1976, p. viii), "to be relaxed is the direct physiological opposite of being excited or disturbed."

Sedative Music is instrumental music that is characterized by flowing, primarily legato melody lines, smooth consonant harmonies, an absence of pronounced or persistent rhythm, with no sudden or marked changes in dynamics or character; music that tends to reduce or sedate physical activity and, possibly, to enhance the contemplative activity of individuals (Gaston, 1968, p. 37).

Story is a narrated, open-ended passage describing a setting, scene, and/or characters in detail, with minimal plot, and no specific ending. The open-ended story sets up and leads into the music-rest and quiet-rest times.

Task Performance is the act of focused attention on a given task that has an observable, measurable outcome. It is the end product or output of a period of appropriate attending to a given task.

Trainable Mentally Retarded (TMR) are those students meeting criteria for placement in a program for TMR individuals as defined by the School Board of Alachua County, Florida (1982). (See Appendix A for criteria.)

Delimitations of the Study

The study is delimited by geographical restriction to Gainesville, Florida, a medium-size city located in Alachua County, in the north central portion of the state. Subjects for the study were TMRs attending primary classes at Sidney Lanier School. Sidney Lanier is a public school for special education of TMRs and other severely developmentally disabled students. Age level of students participating as subjects was 6 to 11 years. No procedures for randomizing or matching were applied, and there was no consideration given to sex or socioeconomic status of the subjects. Results of the study may not apply to TMRs of different age levels, those attending special classes in a regular school, and/or those residing in other parts of the country. One

specific musical selection, a solo Paraguayan harp tune, was used as the independent variable.

Limitations of the Study

The study is limited in that the subject population contains only trainable mentally retarded students of the primary level. Neither sex nor socioeconomic status were variables under study, and there was a possibility of differences in response related to those variables. Subjects' previous experience with listening to sedative or quiet music in a passive manner may limit the study. It is possible that some students have had such minimal exposure to music of this nature that they do not have the appropriate behavioral repertoire to sit or lie quietly and listen. They may have to learn it through each exposure during the treatment phase. Use of one specific musical selection, a guarania (a type of ballad) played by solo Paraguayan harp, as independent variable limits the generalizability of results to other types of music or musical selections. The use of a tape recorder rather than a live presentation for telling of the story may be a limitation, as students may attend differently, in a group, when the teacher tells a story as opposed to hearing it from a stranger's voice on a tape.

The specific task measured could represent a limitation in that some children already have a degree of facility that others do not have. In other words, they are not

matched on ability levels for the dependent variable measure. The task was chosen (as the dependent variable, i.e. matching numbers) because it is one in which all the children have some ability. Since the purpose of the study is not to measure material learned during the course of the project but to measure performance output of an ability or skill each subject had already attained previously, a task that would allow measurement of such a performance variable was necessary.

Overview of Remaining Chapters

Chapter 2 presents a review and analysis of studies on background music, and studies on the subsequent effects of exposure to noise and music. An overview of further research on background music with non-exceptional individuals, the S.A.L.T. method, relaxation training with the handicapped, and the use of contingent music with the mentally retarded is provided in tabular format. Chapter 3 includes the hypothesis, method and procedures of the study, and treatment of the data. Results are presented in Chapter 4, and discussion, conclusions, and implications for educational programming and future research comprise the fifth, and final, chapter.

CHAPTER 2
REVIEW OF THE LITERATURE

Introduction

The problem addressed by the present research, music as a condition prior to performance of a school task, has not appeared in the literature, although several studies concerning the effects of music on behavior have been reported. The available studies most closely related to the present inquiry have been chosen for review and discussion: the effects of background music on task performance and activity level in exceptional individuals, aftereffects of noise stress, and task performance subsequent to relaxing music. Further information on music and on relaxation effects is provided in four different tables, as follows: background music with non-exceptional individuals, relaxation training with the handicapped, the S.A.L.T. method, and the contingent use of passive music listening with the mentally retarded.

It should be noted that reference to classical music in the literature does not pertain solely to music composed in the classic period (1750 to 1810) or strictly in the classic style. Rather, the term is used to designate symphonic or solo music of the traditional concert genre, which may

include selections from the Baroque and Romantic stylistic periods.

Background Music Effects

Background music research provides important information on the behavior of individuals while a music stimulus is provided as part of their immediate environment. The research chosen for presentation is concerned with handicapped populations and covers the years 1967 to 1981. Two categories of background music effects have been identified: effects on activity level and effects on task performance.

Activity Level

The effects of background music on level of activity, as represented in the literature since 1970, are reported and comprise a total of four studies, three with the mentally retarded and one with hyperactive children. Though limited in number of studies, most of the research concerning background music effects on activity level has focused on the mentally retarded, particularly those in institutions.

Mentally retarded individuals. A severely retarded, institutionalized population consisting of 11 males with a mean age of 10.6 years was studied to determine the effects of sedative and stimulative music on their activity levels (Reardon & Bell, 1970). Although subjects were described as severely retarded, their IQs ranged from 9 to 55. For the purpose of the study a checklist consisting of 14 behaviors was developed and utilized on a time-sampling schedule,

every 30 seconds for each 1-hour session. Behaviors to be observed were categorized as continuous, without purpose, and/or repetitive. The authors included wetting and soiling pants as a category of response in the checklist; however, wetting and soiling pants does not seem to fit their definition of behavior to be observed.

Reardon and Bell's experimental design employed four conditions: a) sedative music (Bach chorales), b) stimulative music (rock and roll), c) a spoken version of "Pinnocchio," and d) no recording (baseline). The procedure consisted of replication over two 4-week periods during which subjects received each condition four days a week. The process was repeated the second four weeks with variation in the order of conditions.

Overall results showed no significant differences in behaviors over any of the conditions; however, some variations within and across conditions were observed. There was a trend for activity scores to be higher during the spoken recording than during either of the music conditions, but lower than during the no-recording condition. A lower activity level during stimulative rather than sedative music was observed. The authors concluded that differences within conditions were apparently due to novelty effect rather than effectiveness of the music.

Reardon and Bell's design allowed for the novelty effect to be demonstrated; however, certain elements of the method may be questioned. A 1-hour observation period may

have been longer than necessary to observe an effect; repetition of the stimulus conditions over that time period could have extended beyond the attending and awareness capabilities of the population. A reversal design with music and no-music conditions over a similar time period but with shorter sessions might have given different results. Identification of behaviors which varied most across conditions would seem to be important and would be recommended. Isolating one or two high-frequency behaviors per subject and measuring those specific behaviors under the various conditions may have provided another practical approach to the problem of the research.

The following two studies each measured the same specific behavior. Stevens (1971) and Tierney, McGuire, and Walton (1978) observed the effects of background music on body rocking in institutionalized retardates.

Stevens employed a sample of 12 severely and profoundly retarded subjects (8 males, 4 females) ranging in age from 13 to 21 years. The purpose of her research was to determine whether different tempos of the same music would affect the speed of body rocking in the subjects, all of whom had a high probability of rocking behavior. March music with a strong rhythmical beat, played on the piano, was used for the three music treatment conditions. Each subject's average speed of body rocking, as determined by the baseline observation, was matched in tempo for the first music treatment. The tempos of the marches were increased 16 beats per

minute from the subjects' average rocking rate tempo for the other two music conditions. Subjects were observed daily in 10-minute sessions for each of the four conditions.

Results indicated a decrease in rocking for subjects with a slow baseline speed when the tempo was increased, and a decrease for subjects with fast baseline rates when the tempo decreased. Subjects with medium rocking rates showed little difference between conditions. Stevens' research was basically well designed and demonstrated an effect of music tempo on body-rocking behavior in institutionalized retardates, suggesting that environmental music of moderate tempo can mediate a repetitive and generally purposeless behavior.

Tierney et al. (1978) measured the amount and rate of body rocking during the last five days of each of three, 3-week conditions. During the first and last three weeks of the research no music was provided or available to the subjects in the ward environment. The second 3-week period consisted of currently popular music played throughout the day on the ward. The authors do not indicate the length of day during which music was played; it is assumed the music began on subjects' arising and continued uninterrupted until they retired at night. Twelve severely mentally deficient young adults (seven females, five males) participated in the three phases of the experimental procedure.

Overall results showed greater amounts of body rocking during the music phase, with rates of rocking unaffected,

for both males and females. However, the amount of rocking for females did not change between the second and third phases of the study until the very end of the final no-music condition. The authors make an assumption that the increased amount of rocking in females that continues in the second no-music condition can be attributed to the previous music condition. That assumption seems relatively unsubstantiated based on the data collection schedule employed, i.e. the last five days of each condition. Since the measurement occurred during the last five days of the third condition, the observation itself may have been more related to the effects than the past music condition.

Weaknesses were evident in the research of Tierney et al. The authors did not justify the measurement schedule used; they did not provide a rationale for measuring at the end of each 3-week phase. The design itself is questionable, and there is no explanation for the choice of design. It would seem that measurements taken on a schedule throughout all three weeks of each condition might yield more meaningful information. Three weeks of no music at all seems extreme, as does three weeks of continuous music, making it even more important to assess the behavior under study during the first week of each phase as well as the last week as was done.

These researchers have demonstrated effects of background music on mentally retarded individuals. It was suggested by the authors of the foregoing studies that sedative

or slower music can decrease high rates of behavior, and that faster, more stimulative music can also reduce rates of behavior or activity level. The most controlled study of the three discussed was Stevens'.

Hyperactive children. Windwer (1981) studied 13 hyperactive males between 5 and 8 years of age in a classroom situation. Subjects received seven minutes of a taped ascending music progression cycle, similar to those used in industry, played as background to their art class over a period of nine sessions. An ascending music progression cycle is one in which the music selections gradually become more stimulating over the course of the cycle. The Motor Activity Rating Scale developed by Washburn in 1936 and refined by Downs and Fitzpatrick in 1976, was used to measure movement as the dependent variable. Activity in the class increased during the music program and continued to increase after the music stopped.

Problems in control and description of the methodology were evident in the Windwer study. The author herself stated that music was not novel to the students because the art teacher usually played rock and roll music during class. Thus, the possibility of novelty effect on the resulting data was largely eliminated. There was also no control group or control sessions for the one experimental group upon which to make a comparison of activity level under music and no-music conditions. In addition, the art class was generally much less structured than the typical

classroom, and therefore the students may have been behaving at their usual activity level for the class; without any controls for the variable of activity levels, results remain pure speculation.

Windwer does not indicate whether the experimental sessions were daily or on some interval basis. Further, she does not indicate how many raters were in the classroom assessing the movement variable during the experimental sessions. The question of the relationship of music to activity level with hyperactive children is of importance; unfortunately it remains unanswered because of lack of control in the design of Windwer's study.

Task Performance

The influence of background music on the performance of specific cognitive and work tasks has been studied with the mentally retarded and with hyperactive children. Research on the performance variable has not been extensive with either of these populations: four studies reported are with mentally retarded populations, and one study is with hyperactive children.

Literature reported in the category of task performance with background music spans the years 1967 to 1976. More recent publication on the subject was unavailable.

Mentally retarded individuals. A fairly substantial sample of 60 institutionalized retardates, 30 of each gender, was subjected to music and no music while completing 4 different standardized tests (Sternlicht, Deutsch, & Siegel, 1967).

The tests of verbal and motor functions were categorized as complex or non-complex. The adolescent and young adult subjects, with a mean chronological age of 16 years, were divided into three groups, each serving as its own control. Each group was presented with one music condition: classical, popular, or jazz, and was tested under both the music condition assigned the group and the no-music condition. The authors did not specify whether the treatments were by group or individually, nor did they indicate the length of the treatment sessions.

Classical music facilitated performance on complex verbal tasks better than did either of the other two types of music. Popular music was less facilitative of performance on less complex tasks than classical or jazz. Otherwise the three music types were not substantially different from one another in facilitating task performance.

Sternlicht et al. provided no background literature, other than one brief citation, in support of the study. The research may have been limited by the testing of each group with only one type of music. Since each subject served as his/her own control the researchers might have compared responses during all three types of music in all subjects, thus allowing for additional replications and observances of differential responses to different music within the one experiment.

Stainback, Stainback, and Hallahan (1973) assessed the effects of calming background music (Bach's Air for the G

String) on task-relevant and task-irrelevant learning scores in institutionalized adolescents. The 64 subjects, with IQ ranges from 50 to 87, were divided into groups for the 4 treatment conditions. The conditions consisted of music plus a distractor, music only, distractor only (a tape of hall noises), and no music or distractor. Unfortunately, the learning task itself was not described, only the materials were. Measurement of the dependent variable was unclear, as subject responses to the learning task were not specified.

Significant differences in scores were obtained between music and non-music groups on task-relevant learning. The difference favored the music group; thus, the authors concluded that music may aid attention to relevant stimuli, and that music may also help institutionalized educable mentally retarded (EMR) individuals to process more information.

Stainback et al. submitted for publication only a brief research report. Consequently, much information is not included, such as references and background support, clear descriptions of procedure, and raw data. Lack of such pertinent information makes evaluation of the study difficult, and replication of the study potentially inaccurate.

In contrast to the two previous studies, Cotter and Spradlin (1971) found that institutionalized retarded children correctly answered more addition problems under silence conditions than under music conditions. However, the authors used stimulative, preferred, and therefore

familiar music selections for the background. The 38 subjects, with an average chronological age of approximately 9 years, were presented with alternating 5-minute periods of music and silence over 4 sessions. Cotter and Spradlin concluded that performance was more accurate during silence than music across all four sessions. Since the music tested was loud, rhythmic, vocal, and preferred for listening by the subjects, it is reasonable to expect that listening to the music might distract subjects from working addition problems; thus, the music may have interfered with academic task performance. The schedule of five minutes of music and five minutes of silence could have been distracting, particularly since the character of the music was loud and attention demanding. A selection of calming music, such as the Air for the G String used in the Stainback et al. study may have resulted in different levels of accuracy in addition for the background music phases.

Cotter and Spradlin did not discuss the raw data, which indicated a decline in accuracy under both silence and music conditions over the four sessions. Accuracy also showed more variability under music conditions; during the third session both of the conditions yielded nearly the same levels of accuracy. The researchers seemed to have a bias that leaned toward the contingent use of music, that is using music as a positive reinforcer, rather than the concurrent use of music, as background, in academic tasks with the retarded.

Performance of a repetitive work task was evaluated under conditions of no music, Sousa marches recorded at the regular tempo, the same marches at a faster tempo and at a slower tempo (Richman, 1976). The number of envelopes filled during 10-minute trial periods was recorded for 30 severely retarded institutionalized males over a 6-week period, with each subject tested only once under each of the 4 conditions. Regular tempo march music resulted in a significantly greater mean number of envelopes filled than the no-music condition.

Possible weaknesses of the study lie in the baseline taken from only one measurement of work rate without music, which may not have been adequate to ensure accuracy against which to compare rates during music conditions. The independent variables may pose a problem in that the marches were electronically expanded and compressed to alter the tempos, and the quality of the music after electronic tempo alteration is unknown.

In summary, one of the four studies reported demonstrated that mentally retarded individuals performed tasks more accurately under silence than under music conditions. The Cotter and Spradlin (1971) study used an alternating pattern of music and silence while the task was on-going, in addition to using subject-preferred listening music. The disruption of music playing periodically while subjects were engaged in an academic task possibly had considerable distraction properties. Because the music was preferred by

subjects, it was also likely to be listened to more attentively than less-preferred music.

The other three studies seem to indicate that music which has a lower probability of being frequently listened to by the institutionalized mentally retarded (e.g. classical, calming, or march music) is more facilitative of task performance than music which is listened to more frequently. Also, music presented without disruption was more facilitative of task accuracy and performance. Music of the classical or calming variety has been shown to be more effective than silence conditions in simultaneous task performance.

Hyperactive children. Scott's (1970) small sample (n = 4) study of background music effects on the arithmetic performance of hyperactive boys utilized four conditions: a) the normal classroom, b) the normal classroom with music, c) three-sided booths for individual study in the classroom, and d) individual booths with music. Scott used selections of music popular with the children, from Sergeant Pepper's Lonely Hearts Club Band and Magical Mystery Tour by the Beatles for background music. He found that three out of the four children functioned best under normal classroom conditions with music playing. However, all three of the conditions differing from the normal classroom resulted in marked improvement.

The author was well aware of the limitations of the study, such as the small n. The novelty of the three conditions that differed from the normal classroom seemed to

have had an effect and the subjects were tested only once for each condition.

Scott's study demonstrated improvement in scores while using preferred, familiar, and generally stimulating music, while the previously reported study using popular music with the retarded did not obtain improved results. Scott's study is a reasonable pilot project for the question he addressed. Further research on the specific topic of background music with hyperactive children for effect on task performance ought to be undertaken; no research on the topic beyond Scott's was located in the literature.

Summary of Studies on Background Music With Non-exceptional Individuals

Selected research on the effects of background music on activity, physiological response, and task performance is reported in Table 1. Presented in the table are author(s) and dates of publication, subjects, independent and dependent variables, and results. Weaknesses evident in the studies were addressed and are presented in the table in order to equitably assess relative merits of each study. Studies reported date from 1962 to 1979 and offer information on effects of background music with non-exceptional children.

Six studies are reported, of which three utilized contrasting music--classical, and rock and roll and/or jazz. Three of the studies used only classical-type music, with contrasts of fast and slow selections. Thus, all of the

TABLE 1
BACKGROUND MUSIC WITH NON-EXCEPTIONAL INDIVIDUALS

Authors/ Year	Subjects	Dependent Variable	Independent Variable	Results	Weaknesses
Zimny & Weidenfeller, 1962	n = 54: 18 kindergarten 18 3rd grade 18 6th grade	Galvanic skin Response (GSR), measured by psychogalvanometer	Selected 6-min. portions of Dvorak, Final Movement, New World Symphony, defined as exciting music; Back, Air for the G String, defined as calming music	Exciting and calming music produced differential changes in GSR of children	Ceiling on measurements calibrated on college students; children more responsive and may have shown even greater effects
Engel & Engel, 1962	n = 25: 5th graders age 10-11.5	Performance efficiency on 20 number problems: addition, subtraction, multiplication, and division (5 each) in 45-min. session	Musical distraction (Chopin Piano Concerto No. 2) during weekly arithmetic test; no music alternating with music over 8 weeks	No significant difference between music and no-music conditions	Raw data not presented

TABLE 1 (continued)
BACKGROUND MUSIC WITH NON-EXCEPTIONAL INDIVIDUALS

Authors/ Year	Subjects	Dependent Variable	Independent Variable	Results	Weaknesses
Rieber, 1965	n = 29: 16 male 13 female 5- and 6-year olds	Activity rate, measured by a counter and clock assigned to each of 6 different toys	4, 3-min. conditions per child: 2 silence counterbalanced with 1 fast music (Offenbach, Gaite Parisienne) and 1 slow music (Bach, Air for the G String) condition during 12-min. session	Rates higher during music, especially fast music; rates increased over time regardless of music; number of changes from 1 toy to another showed no effects of music	Novelty of toys may have affected number of toy changes, as this decreased over the session regardless of the music
Baugh & Baugh, 1965	n = 50: college students, 5 groups of 10, assigned to 1 of each 5 conditions	20 nonsense syllables from Hilgard's Classification; Musical Interest Questionnaire	Classical music Chinese music Jazz Rock n' roll No music	Rock n' roll resulted in lowest mean number of nonsense syllables learned; difference in scores not a function of subject's interest in music	Design did not account for whether familiarity of rock n' roll and jazz affected performance or whether musical characteristics of the two genres had the effect

TABLE 1 (continued)
BACKGROUND MUSIC WITH NON-EXCEPTIONAL INDIVIDUALS

Authors/ Year	Subjects	Dependent Variable	Independent Variable	Results	Weaknesses
Carlson & Hergenhahn, 1967	n = 30: 15 male & 15 female college students randomly assigned to 1 of 3 conditions	Writing a list of 8 nonsense syllables correctly in order 3 consecutive times; measurement: trials to completion	Silence Classical music (Swan Lake) Rock n' roll (Beatles selections)	No significant difference between music and control conditions	Raw data, per subject, not provided
Blanchard, 1979	n = 254: 124 males & 130 females age 20-31, university students, divided into 3 groups	Pulse rate, blood pressure, exam score	Rock n' roll Classical No music	Both music groups showed better recuperative activity of the heart (blood pressure & pulse rate), and scored 35-38 points higher on the exam. Significant at 0.01 level	How was blood pressure monitored during exam--was it once per student, and at what point in the exam? Subject of exam not given; academic standing, IQ of subjects not given; author makes some far-fetched conclusions based on the data

studies presented classical music as one of the types of music selections for the independent variable(s).

Learning nonsense syllables was the dependent variable for two of the studies (Baugh & Baugh, 1965; Carlson & Hergenhahn, 1967). Differences in the number of nonsense syllables learned were observed in the Baugh & Baugh study, where the rock and roll music condition resulted in the lowest number of syllables learned. Children's performance on arithmetic problems was the dependent variable in another study (Engel & Engel, 1962). Chopin's Piano Concerto No. 2 was the independent variable during the music condition, and the authors found no significant differences in arithmetic performance between the music and no-music sessions.

College students taking a final examination were grouped and compared for exam scores, pulse rate, and blood pressure before, during, and after classical, rock and roll, or no-music testing sessions (Blanchard, 1979). Both types of music yielded significantly higher exam scores, and more stable blood pressure and pulse rates during and after the exam, suggesting that perhaps test anxiety was under some control. Changes in blood pressure before, during, and after the exam were impressive when comparing the three groups. However, the procedure for measuring blood pressure during the exam was unclear, particularly with regard to the number of nurses and technicians taking the blood pressures and the schedule used in taking the measurements.

Physiological response in children while listening to both exciting and calming classical music was measured (Zimny & Weidenfeller, 1962). Kindergarten, third grade, and sixth grade students produced differential changes in galvanic skin response (GSR) in response to the two types of music, as did college students in previous research. The authors suggested that the children were actually more responsive than college students and may have shown greater effects of the GSR had the measurements not been calibrated on the responsiveness of college students.

Activity rate of young children was compared under fast and slow classical music counterbalanced with no-music conditions (Rieber, 1965). Rates of activity were higher during music, particularly the fast music. However, rates increased over time regardless of the music, although number of changes from one toy to another showed no effects of the music.

In summary, two studies, one with college students and one with fifth grade students, showed no difference in performance of a task between music and no-music conditions. In college students, one study resulted in differential performance between types of music (rock and roll yielding the lowest performance), while another showed better response with two different types of music, both on exam scores and in physiological response of the heart. Children were demonstrated to produce differential GSR responses to exciting and calming music. Finally, young children's activity rates

increased with faster music. Four out of six studies demonstrated a measurable difference in the dependent variable under some type of music condition, two studies comparing different types of music, and two studies comparing different types of music with no music. Each study also demonstrated some weakness (see Table 1, last column), from lack of complete information to design flaws, which must be taken into account in evaluating the results obtained.

Overall, the background music studies reviewed were useful to the present investigation in that responses to sedative and stimulative music were observed, under varying levels of control. Information from the research contributed to the selection of the independent variable utilized in the present study.

Effects of Noise and Music on Subsequent Behavior

Due to the nearly absolute lack of literature on the subject of music as a prior condition to behavior or task performance, closely related research was sought for information that might be pertinent to the consideration of music as a prior condition to performance. The importance of noise research lies in its demonstration of measurable aftereffects in individuals subsequent to noise exposure; noise and music are related as both are sound waves that produce auditory sensation. Presently in the literature only one study addresses music as preparation for a subsequent cognitive task. The music experiment reviewed and discussed in

this section of Chapter 2 is more specifically related to the question under study than any other available research.

Noise Aftereffects

An entire monograph of studies on noise as a social stressor was published in 1972 by Glass and Singer. Their research addressed frustration tolerance and quality of performance during and after periodic and aperiodic intermittent, generally aversive, noise bursts. The noise tape used as independent variable in the studies consisted of various environmental sounds, such as office machines in use and people speaking foreign languages (the research was conducted in New York City), superimposed upon one another.

The variable of perceived control over the noise and its effect on subjects' task performance and frustration tolerance was included in the research, as was the variable of behavioral aftereffects of unpredictable noise. Glass and Singer's studies were well controlled and conducted in a laboratory setting, with findings that generally unpredictable and/or (perceived) uncontrollable noise resulted in greater subsequent performance error on proofreading tasks, and lower frustration tolerance.

Two studies by Glass and Singer were later replicated by Donnerstein and Wilson (1976) on 60 male college students; the second of these experiments is reported. Using the previous research as a model, the authors presented their subjects with intermittent bursts of white noise at

95dB under conditions of perceived control and no perceived control over the noise. Subjects were measured on number of correctly completed math problems, anger, and aversiveness of the noise. The noise was considered less aversive by subjects in the perceived-control condition than subjects in the no-control condition. Subjects in the noise/no-control condition were also more aggressive after the experimental procedure. Number of math problems correctly completed during the noise conditions was not significantly different for each condition, suggesting that subjects adapted to the noise during ongoing task performance. Perceived control over the noise seemed to eliminate any negative consequences due to noise exposure.

The design of Donnerstein and Wilson's study is complex and confusing to understand as it is presented; the procedure is difficult to follow. A schematic of the design included in the report would have been helpful. Many variables were manipulated and measured in both of the experiments included in the report. Aggression was one of the dependent variables; some subjects were made angry in the first phase of the experiment. Those angered initially via experimental procedure and placed in noise/no-control conditions demonstrated increased aggression, which was apparently the primary purpose of the study, as task performance was only measured during the noise conditions.

The question under study was the effect of perceived control over a generally distracting, aversive stimulus,

rather than distraction of a particular or specific stimulus. It would be interesting to discover whether effects of other aversive distractors (e.g. visual, physical discomforts) would be mediated if subjects perceived control over those conditions.

Glass and Singer, and Donnerstein and Wilson have demonstrated that there is an aftereffect of aversive noise stimuli, which results in impairment of task performance and negative effects on interpersonal interactions, as evidenced by increased aggression. Their research has also identified the variable of perceived control over noise in eliminating or substantially decreasing negative effects of the noise.

Behavior Subsequent to Music

Finally, one study addressed the effects of music listening (passive music) on subsequent task performances. Borling (1981) wanted to know if sedative music would increase the production of alpha brain-wave rhythms, and whether the treatment would then affect the subject's ability to focus attention. Alpha production was measured while subjects listened to either sedative or stimulative music for a 5-minute period. The sedative music selection was Debussy's G Minor String Quartet; Ride of the Valkyries by Wagner provided the stimulative music. Forty psychology students served as subjects and were identified as either high creative or low creative, determined by their scores on Hoepfner and Hemenway's Test of Creative Potential.

Subjects were assigned to control (stimulative) or contact (sedative) groups so that both high and low creatives were equally represented in both conditions, with n = 10 in each of the four groups. The dependent variables for Borling's study were time spent in alpha, and score on the Maze Tracing Speed Test (MTST), a timed 3-minute test created by French, Ekstrom, and Price. Independent variables were sedative music for the contact groups and stimulative music for the control group. Subjects completed the MTST immediately after the 5-minute listening session ended.

No significant differences were found in alpha production for stimulative and sedative music, but both low creative and high creative groups receiving sedative music scored significantly higher on the MTST than the groups receiving stimulative music. Time spent in alpha correlated significantly with the MTST scores, although the actual correlation was only 0.43. Degree of creativity did not influence subjects' abilities to focus attention, although the mean score on the maze test was highest for high creative subjects within both the contact and control groups.

Borling does not explain his rationale in selecting five minutes for the music-listening time, although it does seem to be a reasonable amount of time for inducing a state of restfulness and calm in subjects. Baseline alpha levels prior to the treatments were not measured, rather, the subjects were given eight math problems to work to ensure a state of active alertness at the outset of the music

listening. It was therefore assumed that no subjects were producing alpha waves when the music treatment began.

Groups each received only one music treatment and measurement of the dependent variables, alpha waves and the maze test. Replication with the same subjects may have provided enlightening data and would be recommended in any further study. A strength of the research is that the experimenter asked a question that has not received previous attention in the literature, and thus he has provided initial data on this subject of inquiry, the effect of music on subsequent task performance. Borling's study bears close resemblance to the present study, and therefore his design and results are of particular interest to the investigation.

Summary of Related Studies

The following three sections contain summaries of research on relaxation training with the handicapped, the S.A.L.T. method, and the contingent use of music with the mentally retarded. Tables containing summaries of studies in each section are included.

Relaxation Training

Relaxation training as an adjunct within special education programs has not been widely reported, although its use has been proposed as potentially effective in the classroom setting. Most of the data collected have been on relaxation training with hyperactive males (see Table 2).

TABLE 2
RELAXATION STUDIES WITH EXCEPTIONAL CHILDREN

Authors/ Year	Subjects	Dependent Variable	Independent Variable	Results	Weaknesses
Carter & Synolds, 1974	n = 32 males; experimental: 8-11 yrs., WISC IQ range 87-107; students in special classes for minimally brain-injured Control: 32 randomly selected age mates	Handwriting quality: space, size constancy, line quality, letter formulation, neatness & overall legibility. Two independent judges: certified regular elementary classroom teachers, rated handwriting on a 5-point scale ranging from excellent (5) to poor (1)	Relaxation training tape, 7 mins., 3 days/wk. for 4 wks., played prior to writing task	Ratings on each variable from 1st to 3rd paper increased; areas with highest initial ratings showed least gain, and areas with lowest initial scores showed most gain; subjective observations: speed increased with relaxation time; muscular tension & pressure while writing decreased	Control group subjects were in regular classes

TABLE 2 (continued)
RELAXATION STUDIES WITH EXCEPTIONAL CHILDREN

Authors/ Year	Subjects	Dependent Variable	Independent Variable	Results	Weaknesses
Bhatara, Arnold, Lorance, & Gupta, 1979	n = 9 males: 5 experimental, 4 control	David's Rating Scale	Electromyograph (EMG) biofeedback sessions and muscle relaxation tapes for use at home	Teacher rating: worsening of behavior for both groups (nonsignificant); parent rating: experimental group significantly improved from pre-test to 4th week post-test	Criteria for selecting subjects as hyperkinetic not given, a condition of many other studies criticized by the authors; article provides excellent literature review but presents limited information and no raw data on study reported by authors
Omizo, 1980	n = 56 hyperactive males age 13-16 yrs. Subjects matched & paired, then randomly assigned to experimental & control groups	Nowicki-Strickland Scale (locus of control); Dimensions of Self-Concept, Form S (measures 5 noncognitive factors associated with self-concept in the school setting)	Biofeedback-induced relaxation training using EMG, & a taped relaxation program; 3 treatment sessions over a 13-wk. period	Experimental subjects showed increased internal locus of control & one noncognitive factor, Level of Aspiration	Few treatment sessions

A summary of studies presented indicates the primary (and in these representative studies, the only) population is males identified as hyperactive. The three studies present data on electromyographic (EMG) biofeedback and muscular relaxation techniques.

Bhatara, Arnold, Lorance, and Gupta (1979) assessed their nine subjects on the David's Rating Scale for behavior, and treated subjects with EMG biofeedback sessions and muscle relaxation tapes for use at home. Bhatara et al. found conflicting results between parent ratings and teacher ratings of behavior. Although not significant, the behavior as judged by teachers worsened over the course of the experiment while parents' behavior ratings significantly improved at the post-test. The criteria for selection of hyperkinetic subjects was not provided, a frequently-criticized condition of many studies cited by the authors in their literature review. The literature review was quite comprehensive, a positive feature of the article. Unfortunately, the authors' own research seems to be included as an afterthought to the literature review, as limited information on subjects is given and no raw data are included in the report of the study.

Omizo (1980) researched EMG biofeedback and a taped muscle relaxation program with 56 hyperactive adolescent males are measured the effect of the relaxation program on locus of control and self-concept in the school setting. Half of the subjects received the treatment and showed an

increase in internal locus of control and in one self-concept factor, Level of Aspiration. With only three treatment sessions over a 13-week period, it is unwise to attribute the results only to the relaxation treatment of the study. Uncontrolled factors, such as maturation, may have been operating to affect the results.

Relaxation training effects on a traditional school task have relevance and practicality for the teacher. Carter and Synolds (1974) tested a 7-minute relaxation training tape used in the classroom immediately prior to a handwriting task. Students' handwriting was rated by two independent judges (certified elementary school teachers) on a 5-point scale. Results, in Table 2, have practical implications for teaching. Areas needing most improvement made greatest gains over the course of the study. Muscular tension and pressure while writing decreased in the students while speed of writing increased with relaxation time. The experimental subjects were boys between 8 and 11 years of age who were in special classes, while the control subjects were the same age but in regular classes. The difference between experimental and control groups (i.e. special versus regular classes) presented a weakness in the control aspects of the design. Overall, Carter and Synolds described research of practical value to teaching. By introducing a short prepared relaxation session into class a few times each week, an improvement in an academic skill was attained.

Thus, relaxation was demonstrated to be a facilitative preparatory phase to active learning and task performance.

S.A.L.T. Method

Suggestive-Accelerative Learning and Teaching involves both relaxation and presentation of specific music to facilitate learning within a specially-designed format. Data on the effectiveness of the method with handicapped persons are largely limited to learning disabilities or remediation in reading and/or math. Two studies utilizing the S.A.L.T. method with such populations are summarized (see Table 3).

Seventeen remedial reading students participated for 14 weeks in the Lozanov Method (described in Table 3) as part of their reading program (Pritchard & Taylor, 1978). Over half the students gained one year or more on the three skills measured: oral reading, silent reading, and word recognition. Although 40 subjects actually participated, data for only 17 were reported because the other 23 subjects were classified EMR and did not fit the criteria of the publishing journal. Exclusion of the additional data is a type of malfeasance of research practice. All the data should be considered important to include, particularly in this study, as the differences between subjects could not have been too great since all of them were participating in essentially the same reading program.

Math, reading, and affective relations were measured using Key Math, Woodcock Reading, and the Brooks Student

TABLE 3
SUGGESTIVE-ACCELERATIVE LEARNING AND TEACHING (S.A.L.T.)

Authors/ Year	Subjects	Dependent Variable	Independent Variable	Results	Weaknesses
Pritchard & Taylor, 1978	n = 17: remedial reading students age 8-13	Spache Diagnostic Reading Scales: Oral Reading, & Word Recognition Subtests	45-min. sessions of the Suggestopedia Cycle of the Lozanov Method, for 17 wks.; Active & passive relaxation, breathing & rhythmic exercises, Baroque music in 4/4 time, dramatic & contrasting presentation of material	81% gained a year or more on Oral Reading; 81% gained a year or more on Silent Reading; 53% gained a year or more on Word Recognition	40 subjects actually used; 23 were EMR & their data was not reported, apparently due to journal restrictions
Schuster & Vincent, 1980	n not clearly stated; 9 (math), 9 (reading), 11 (affective relations); learning disabled students bused to a special learning center for remedial classes	Key math; Woodcock Reading; Brooks Student Questionnaire, Affective Relations	Music for relaxation & visual imagery at beginning & end of class, for one school year	Significant improvement at 0.01 level for math & reading, and at 0.05 level for Affective Relations; Math - 1.4 yr. gain; Reading - 2.2 yr. gain; Affective - ~6.27 gain	No literature references; procedures & methodology not specified; score on Brooks Student Questionnaire not explained or discussed; no control group

Questionnaire with learning-disabled students (Schuster & Vincent, 1980). Portions of the S.A.L.T. method comprised the independent variable, music for relaxation and visual imagery at the beginning and end of class for an entire school year. Improvement in all three measured areas was significant, but several factors make the results suspect. The number of subjects is not clearly stated. It appears that some students were measured on all three variables while others were only measured on one or some combination of two of the three variables. No control group was used, and procedure and methodology were vague and unspecified. Finally, the affective relations score on the Brooks Student Questionnaire was a negative number that was not explained or discussed.

A potential for teaching with the S.A.L.T. method for some exceptional students has been demonstrated. Unfortunately the method's effectiveness with exceptional populations other than learning-disabled or remedial students cannot be determined without the data, which were withheld for EMR students in Pritchard and Taylor's report.

Contingent Music With the Mentally Retarded

Finally, Table 4 presents summaries of studies assessing the effectiveness of music as a reinforcer to improve performance or behavior and/or to teach skills. The data reported reflect only research with the mentally retarded. Because music is the consequence for performance, rather

TABLE 4
CONTINGENT MUSIC WITH THE MENTALLY RETARDED

Authors/ Year	Subjects	Dependent Variable	Independent Variable	Results	Weaknesses
Cotter, 1971	n = 16; moderately retarded females 12-21 yrs. Matched in yoked pairs for music contingency	Packaging washers in envelopes.	10 sessions of 5, 15-min. segments, no music, preferred music (alternating). Contingent member of each pair earned additional 15 seconds of music for both members for each task completed	Work production increased significantly when music available; contingent subjects worked significantly faster than non-significant subjects; non-contingent subjects' work rates gradually increased over session until they worked at rates similar to contingent subjects during final 5 sessions	

TABLE 4 (continued)
CONTINGENT MUSIC WITH THE MENTALLY RETARDED

Authors/ Year	Subjects	Dependent Variables	Independent Variables	Results	Weaknesses
Cotter & Spradlin, 1971	n = 54: mean CA = 13.8 yrs., mean MA = 7.4 yrs., mean IQ = 57.63	81 match to sample addition problems per 20-min. session	Three experiments: 1) contingent music & silence, 2) contingent music & non-contingent music, 3) contingent music & white noise; music selections preferred by subjects, from Motown Sound album	Computation rate increased over contingent music sessions; greater increase in computation rates per session during contingent music than during control sessions	
Bellamy & Sontag, (1973) (2 experiments reported)	Exp. 1: n = 4, mean age 12.1 yrs., mean IQ 42	Exp.1: Stuffing envelopes	Exp. 1: 5-phase design, no music, continuous music, contingent music 30 secs., contingent music 20 secs., continuous music	Exp. 1: 20 sec. contingent music - higher production rates	Raw data showed much variability within each phase but authors did not discuss it
	Exp. 2: n = 7, mean age 16.6 yrs., mean IQ 46.8	Exp. 2: Bagging & labeling drapery hooks	Exp. 2: 5-phase design, alternating continuous music with contingent music	Exp. 2: Contingent music - higher production rates than continuous music	

TABLE 4 (continued)
CONTINGENT MUSIC WITH THE MENTALLY RETARDED

Authors/ Year	Subjects	Dependent Variables	Independent Variables	Results	Weaknesses
Jorgenson, 1974	n = 1: male 9 yrs. old, mild retardation (single case design)	Following directions, stereotyped behavior	Record listening (high preference music activity) contingency	Following directives increased to 100%; stereotyped behavior decreased to one per session	
Metzler, 1974	n = 30: profoundly retarded, institutionalized females, age 16-55 yrs., IQ < 35, randomly divided into 2 control & 1 experimental group	Imitative behavior (work task); duration of imitating; amount of work done; Discrimination of colors, shapes of objects	No music control; continuous music control; contingent music; music used - Mitch Miller Marches	No significant differences in imitative behavior among the 3 groups	
Underhill & Harris, 1974	n = 4: moderate to untestable mentally retarded, age 9-13 yrs.	10 imitation tasks each session, rated by observers	Reversal design: no music; continuous music; contingent music	Contingent music effective in increasing overall percentage of imitative responses	Specific music selections not given; was the music familiar or unfamiliar, preferred by subjects or not?

TABLE 4 (continued)
CONTINGENT MUSIC WITH THE MENTALLY RETARDED

Authors/ Year	Subjects	Dependent Variables	Independent Variables	Results	Weaknesses
Miller, 1977	n = 30: 21 males, 9 females, EMR, IQ 50-75, age 9-14 yrs.	Performance on arithmetic problems	High preference music (rock n' roll); low preference music (classical); no music	Significantly better performance in both contingent music conditions; subjects' music preferences not affected by experiment	
Greenwald, 1978	n = 4: profoundly retarded institutionalized adolescents, nonambulatory, multihandicapped, IQ < 20	Duration of inappropriate target behaviors per subject	Distorted music; interrupted music; provided 11 mins. twice/ day daily for 6 wks.	No dramatic changes in inappropriate behavior; data fluctuated sharply	Subjects very unaware of environment, & music stimuli may have been part of that unawareness
Holloway, 1980	n = 8: severely retarded institutionalized, nonverbal, with normal hearing, responsive to music stimuli	Two target behaviors for each subject (Ex.: throwing ball, stacking blocks, etc.)	Tape recorded song praising subject for task completion; playing preferred rhythm instrument	Significant improvement during both music conditions compared to no music; no significant difference between music conditions	Preferred rhythm instrument used but subjects had no choice of passive music for reinforcement

than a concurrent or preliminary stimulus (to performance) the data presented are not discussed at great length. Ten studies are displayed in Table 4, three on work production rates, two on inappropriate behavior, two on arithmetic problems, two on imitation, and one on manipulative tasks. Two of the 10 experiments reported no significant differences resulting from the music contingency. It should be noted that in both cases of nonsignificance the subjects were profoundly mentally retarded and may have been only marginally aware of the music as a passive element of their environment.

All of the remaining eight studies showed improvement in production rates, correct responses, and targeted behaviors when contingent music was applied. Most of the research was well designed with only minor weaknesses. The raw data for Bellamy and Sontag's first experiment showed much variability within each phase, but this variability was not discussed or acknowledged by the authors. Underhill and Harris did not specify the music selections used for reinforcement of subjects' responses. It would seem important to know whether the music was familiar or unfamiliar to the subjects, and/or whether the music was preferred by the students. Holloway used rhythm instruments of subjects' choice for active reinforcement, but rather than choosing subject-preferred music for passive reinforcement (listening), she apparently composed her own song and tape recorded it for use as the passive music reinforcer. A more equitable

comparison may have been made if subjects had been reinforced with music for listening which was high preference for them.

Four studies had very small n's of less than five. A small n is not so critical in operant research, which is largely single-subject design where replications can be observed in the same subject many times within one experiment.

Summary

Research has demonstrated, to some degree, the effectiveness of music (presented for listening) as a reinforcer for various behaviors and skills with the mentally retarded, and the potential utility of relaxation training to improve behavioral and academic performance at school and in the home with hyperactive boys. For remediation of math and reading the S.A.L.T. method, with its combination of relaxation and music, appears to be effective and readily applicable to the learning disabilities and remedial classroom settings.

It would appear that many topics for experimentation can be pulled from the literature. Certainly there are few answers but numerous possibilities when the independent variable is music. Research with direct relationship to the present study is not available and it must be assumed that such research has not yet been done. The forthcoming data may contribute to the knowledge base of music with exceptional individuals.

CHAPTER 3
METHODS

Methods and procedures of the study are presented in this chapter. The chapter is divided into six sections: statement of the null hypothesis, description of the subjects, description of the research instrumentation, description of the treatment variable, description of the procedures, and treatment of the data.

Statement of the Null Hypothesis

The study addresses one question, which is posed as the null hypothesis to be tested.

Ho: There will be no significant difference in task performance of matching numbers, as expressed in rate of correct responses, between trainable mentally retarded (TMR) students receiving a story-passive music listening and a story-quiet resting time immediately prior to the task.

Description of the Subjects

Subjects for the study were 17 primary level TMRs attending Sidney Lanier School in Gainesville, Florida. Two similar self-contained classrooms were involved; the younger class, Group C, contained seven males and one female with

ages ranging from 6 years 11 months to 9 years 2 months; the older class, Group P, consisted of eight males and one female with ages ranging from 10 years 4 months to 11 years 2 months. The subjects were all identified TMR based on the Alachua County criteria (see Appendix A) and placed in the appropriate classes for their ages and academic levels.

All subjects had hearing within normal limits, as determined by speech therapy and audiology assessments, and none of the subjects had gross physical impairments. Student involved as subjects in the study had some level of ability in number recognition and were able to match at least 5 numbers out of 20. The experimenter and her confederate tested each subject for baseline number-matching abilities prior to the study. Subjects were given 5 minutes to match up to 20 numerals using a number board and matching cards. Appendix B contains subjects' pretest number-matching data.

Approval for students to participate as subjects was obtained through the University of Florida Institutional Review Board, the Alachua County School District, and the students' parents or guardians. (See Appendix C for copy of the letter of informed consent which was sent to parents and guardians.)

Research Instrumentation

The dependent variable for the study was performance on a matching numbers task; digits from 1 to 20 were used.

Materials for each student consisted of cream-colored tag board sheets, 12 by 18 inches, divided into equivalent spaces and numbered consecutively, left to right and top to bottom, from 1 to 20 in heavy black ink. A strip of cream-colored double-sided tape attached to each number space prevented matched cards from sliding off or being too easily removed. Each student received a stack of cards, prepared by cutting a duplicate of the number board (with exception of the tape) into 20 squares, each marked with a numeral from 1 to 20. The cards were shuffled so they were not in order when the subjects received them. The task for the subjects was to match each card with its identical number on the number board, by placing the card over the number.

Students were grouped and seated around tables assigned to a teacher or experimenter responsible for observing them. Subjects were instructed to begin, by the experimenter in the classroom, and all students then worked independently without interruption from teachers or experimenters. Subjects were given five minutes to work on the number matching. At the end of that time the boards and cards were collected, while students took their seats for the next activity. Subjects who completed the number matching prior to the 5-minute limit remained seated after their matching materials were removed. Total number of cards placed, numbers correctly matched, and amount of time working on the task were recorded for each student for every session, on their individual number boards.

At the completion of the 2-week study a subjective teacher questionnaire (see Appendix D for form) was given to the teachers and aides who participated as observers in the study. The purpose of the questionnaire was to provide additional information on the attitude of the teaching staff towards the treatment portion of the study, and their perceptions of the effectiveness of the treatment.

Independent Variable

The independent variable was derived from a technique of music-facilitated relaxation developed by Bonny and Savary (1973). The technique is called Guided Imagery to Music, or GIM. The GIM process involves a relaxation procedure, an induction such as an open-ended story or suggested scene, and appropriately-selected music. The main purpose of GIM is to assist individuals in working through psychological problems (such as neuroses) via relaxation and imagery, which is enhanced and facilitated by the music and a guide. The process of GIM is not entirely appropriate for the population (TMR) tested in the study nor is its primary intent consistent with the purpose of the study. However, the structure of induction plus music to encourage relaxation lends itself to the design and purpose and, with modification and adaptation, to the TMR classroom.

The music selection used is entitled "Nde Rendape Ayu" and was composed by Jose Asuncion Flores. The composition is a Paraguayan guarania, which is a "ballad in slow waltz

tempo, usually in a minor mode" (Apel, 1969, p. 360). The recording artist, Alfredo Rolando Ortiz, physician and music therapist, plays the Paraguayan harp (the National Instrument of Paraguay, South America) professionally. The harp weighs only 10 pounds and is made of wood with nylon strings; it has no pedals and is played with the fingernails.

The guarania played on this particular folk harp was chosen because of its character and quality, and its potential for motivating relaxation. The duration of the composition is 5 minutes 26 seconds, and it is performed with solo instrumentation without accompaniment. The composition is in a major key and consequently has a bright, uplifting character. It begins on an anacrusis to an eight-bar introduction in one, followed by a two-bar bridge, in three, to the main theme. The main thematic material is repeated throughout the composition with variation in dynamic level, octave, and ornamentation. The entire piece is characterized by arpeggiation, the playing of notes of chords in succession (much like finger-picking on the guitar) rather than simultaneously. Other stylistic elements employed include a rocking pattern in the bass consisting largely of eighth and quarter notes, and occasional termolo on the higher strings. The harmonic texture leans toward polyphony (two or more individually-designed parts, or lines, played simultaneously); however, an identifiable melodic line generally predominates. The tempo is larghetto, ranging from 84 to 88 beats per minute (MM84-MM88), although the artist

utilizes much rubato (flexibility of tempo) in his performance. The various sections of the composition are punctuated by ritardando; dynamic levels throughout range from piano to mezzoforte.

The chosen composition was successful in assisting relaxation in a field test prior to the study on a sample population of upper primary level TMRs. In order to ascertain the effectiveness of the independent variable in producing a condition of calm, relaxed behavior in the subjects, observations were taken throughout the treatment periods, both control and experimental. Each teacher and experimenter observed two to three subjects for verbal and motor behaviors, recording each occurrence on the Behavior Tally Form (see Appendix E for form). All observers were trained by the experimenter in the recording of specific behaviors and in the use of the form. Inter-rater reliabilities were established on observation prior to the study, using the formula: agreements/agreements plus disagreements. The three observers in each class recorded behaviors of the same two students for a 2-minute period. Reliabilities for raters of Group C were 0.67 for motor and 0.83 for verbal. Group P rater reliabilities were 0.67 for both motor and verbal behaviors. Although the inter-rater reliabilities for each group were not high, it was determined that the data recorded by the observers would provide general

indications of the level of activity and/or relaxation during the rest with music and rest without music phases for both groups.

Procedures

Materials and Equipment

The study took place in two self-contained classrooms located in the Center for the Trainable at Sidney Lanier School, in Gainesville, Florida. Classrooms were the same size, carpeted, of similar organization, and contained chairs and tables, book centers, and television sets. Rooms also included sinks, cupboards, cabinets and closets, chalkboards, bulletin boards, and flannel boards.

The experimenter provided materials and equipment necessary for the study. Felt boards and felt characters corresponding to the taped story were used. The characters consisted of children resting and playing together, a man playing a harp, a guitar, musical notes, and trees, all placed on the felt board to create a scene suggested by the recorded story (see Appendix F for text of the story). Wollensak tape recorders, models 2620 and 2851, were brought into the classrooms for playing the experimental and control tapes. Behavior Tally Forms and the number boards and cards were stocked in each classroom.

The story was recorded directly onto a Memorex MRX1 60-minute cassette tape for the experimental tape, and a TDK AD-C90 90-minute tape for the control tape, using a

Wollensak Model 2820AV cassette tape recorder. The music was recorded from the disc directly onto the experimental tape at the end of the story section. A Wollensak Model 2615AV cassette recorder was used to tape the music on direct input from a Panasonic Technics Direct Drive Player System Model SL-1100A.

Treatment Conditions

Experimental and control sessions of the study were held in the self-contained classrooms and were included as part of the morning curriculum activities for the 6-day duration of the study. Sessions were scheduled on Monday, Wednesday, and Friday over a 2-week period, beginning on a Friday and ending on Wednesday of the second week. Sessions lasted for the duration of the 1 minute 45 second taped story, a 5 minute 26 second music-rest or rest period, plus 5 minutes of number matching. (Refer to Table 5 for order of experimental and control sessions.) An experimenter, teacher, and teacher's aide were present in each class during the concurrent treatment and control sessions, and each was responsible for observing two to three students.

The primary experimenter, in Group P, had trained a confederate experimenter prior to the study, who was her counterpart in Group C. The experimenters placed the characters on the felt boards during the study, instructed students between the story and rest phases to lie down and rest quietly, and to go to their places at the end of the rest

TABLE 5
ORDER OF SESSIONS

Event	Duration	Observation
1. Taped story listening with felt board	1 min. 45 sec.	
2. Rest, with music (E) or without music (C)	5 min. 26 sec.	Motor & verbal behavior
3. Number-matching task, numerals 1-20	5 min.	Total numbers correctly matched/ time

and music-rest phases. Turning the tape recorder on and off, and starting and stopping the number-matching task by indicating the time was also the responsibility of the experimenters.

Sessions began in both classes at 9:30 a.m. with the taped story accompanied by felt board pictures which were placed, by the experimenter in each class, on the board as the story progressed. Students were seated on the floor in front of the story board and tape recorder so that all subjects could see the pictures and hear the story. Students were instructed to be quiet, listen, and watch the board before the taped story began. The volume of the tape was set at a comfortable mid-range level for both experimental and control sessions. At the conclusion of the story the lights were turned off; the only available light in the room was that which came through the windows.

During control sessions students were instructed to lie down, close their eyes, and rest for a few minutes until instructed to go to their seats for number matching. The sound of a finger cymbal, struck lightly with a tiny metal rod three times, on the tape signalled the end of the rest period. The rest time corresponded to the 5 minute 26 second music selection time on the experimental tape.

In experimental sessions the music began a few seconds after the story concluded, allowing just enough time to turn off the lights and position the subjects for rest. Subjects in the experimental condition were instructed to

lie down, close their eyes, and listen to the music. They remained on the floor in a quiet restful manner until the music ended.

After the rest phase concluded subjects moved to the tables and seated themselves in their assigned places for number matching; number boards were placed on the tables at students' assigned spaces before the session began. Cards for matching were given to the subjects as the cue to start was given. As students completed the task their materials were removed by the observer. The experimenter in each class called "stop" when the 5-minute period ended; time was kept by the experimenter watching the large wall clock with second hand in the classroom. Results were then tallied by each observer for their subjects, and recorded on the subjects' number boards.

Data Analysis

The data collected on both groups for the task, matching numbers, were analyzed by a *t*-test for dependent samples. Differences in means across treatment and control conditions were evaluated as a test of the hypothesis of the study. Comparisons of group means were made across experimental and control conditions for Group C and across experimental and control conditions for Group P. Data from the Behavior Tally Form, on which the amounts of motor and verbal activity were recorded, were also analyzed by a *t*-test comparing both groups across experimental and control

conditions. Further data from the Teacher Questionnaire, not subjected to inferential statistics, were compiled and are presented.

The design of the study was a replication with two groups, both groups receiving both conditions in reverse order. The design schema is presented in Figure 1. An acceptable level of confidence for this study was set at 0.05.

Session	1	2	3	4	5	6
Group C	X0	X0	X0	0	0	0
Group P	0	0	0	X0	X0	X0

X = treatment (independent variable)
0 = observation (dependent variable)

FIGURE 1
DESIGN SCHEMA

Raw data for individual subjects were assessed and are presented. Comparisons of the data for subjects in both groups between experimental and control conditions are discussed in the following chapter.

CHAPTER 4
RESULTS

Results of the study are presented in Chapter 4. The chapter includes summary statistics describing the raw data for a) the treatment validation, b) the dependent variable, number matching, and c) the teacher questionnaire which was completed, by the teachers and aides who participated, at the conclusion of the study. The inferential statistics for number matching are presented and discussed, and finally, the results are summarized for all data.

Summary Statistics

Subjects were tested for rate of correct number matching over six sessions, three experimental (E) and three control (C). Data on treatment validation were also taken and assessed during the treatment and no-treatment phases, and teacher questionnaires were completed after the study was finished. All raw data are presented and discussed in the following sections.

Treatment Validation

The purpose of the treatment validation was to demonstrate that the music had relaxing capabilities for trainable mentally retarded (TMR) students. The measurement allowed for counts of occurrences of motor and verbal

behaviors, but not for the magnitude or duration of those behaviors. Raters were trained by the experimenter in the recording of specific behaviors. Inter-rater reliabilities for the combined motor and verbal behaviors were 0.67 in Group P and 0.75 in Group C.

During the control sessions where the rest time occurred without music, subjects in both classes exhibited greater amounts of the two types of behaviors. During the rest period paired with music the behaviors in both classes decreased over the sessions.

The mean number of combined behaviors was much higher in Group P, the older subjects, than in Group C over all sessions, and behaviors showed a greater decline under experimental conditions in Group P. Although Group C had fewer occurrences of behaviors under both conditions, there was a very slight decline in number of behaviors over the experimental conditions. The raw data (see Appendix G), recorded on the Behavior Tally Form, showed less activity in experimental conditions; however, the observers of Group C verbally indicated to the experimenter that the subjects were more active and disruptive during the rest time with music than the rest time without music.

The mean number of behaviors during the treatment phase decreased by 21.4 in Group P, from 64.3 occurrences during control sessions without music, to 42.89 occurrences during treatment sessions with music. Group C showed a very minimal decrease of 0.57 over experimental conditions. The

mean number of combined behavior occurrences for Group C during control conditions was 16.29, while during experimental conditions the mean was 15.7 occurrences of behavior. Group P decreased behavior and activity level by one third; however, the decreases in behavior for Group C are negligible. The *t*-tests comparing behaviors for each group under both conditions showed a significant decrease in behaviors for Group P in experimental music sessions, but no difference for Group C in behaviors across experimental and control conditions (see Table 6).

Number Matching

Numbers matched were measured in rates of correct response per minute, with 5 minutes given to match up to 20 numerals, 1 through 20. Six out of 17 subjects, overall, increased their mean rates of correct response during experimental conditions, while 11 subjects exhibited decreased rates of response (see Tables 7 and 8). Twelve of the 17 subjects increased correct response rates over time regardless of experimental or control conditions; 7 subjects in Group C, who had experimental conditions first, still increased rates during control conditions the second week.

Data for Group P indicated that three of the subjects (numbers 1, 2, and 8) increased rates under the experimental conditions rather consistently; two of the subjects (1 and 8) had increases of more than one point. Two of the subjects decreased rates of correct number matching during

TABLE 6
COMBINED MOTOR/VERBAL BEHAVIORS DURING
MUSIC-REST AND REST CONDITIONS

Group		Music-Rest	Rest	t	p
P	$\bar{X}$	42.89	64.33	-2.47	0.04*
	SD	27.23	34.28		
C	$\bar{X}$	15.71	16.29	-0.18	0.86
	SD	9.09	7.32		

*$p \leq .05$

TABLE 7
GROUP C RATES OF CORRECT NUMBER MATCHING

Subject	E_1	E_2	E_3	Mean	C_1	C_2	C_3	Mean
1	1.4	2.2		1.8	1.4	1.4	2.8	1.87
2			2.0	2.0	2.2		2.8	2.5
3	1.0	0	0.8	0.6	1.4	1.0	1.4	1.27
4		1.3	2.2	1.75	1.5		3.25	2.38
5	0	0	0.3	0.1	0.3		0.5	0.4
6	1.0	6.67		3.84		5.0		5.0
7*	1.0	1.4	1.0	1.13	0.67	0.75		0.71
8	1.4	2.6	1.6	1.87	2.0	2.6		2.3

*Indicates subject who increased his mean rate of correct number matching in experimental conditions

TABLE 8
GROUP P RATES OF CORRECT NUMBER MATCHING

Subject	E_1	E_2	E_3	Mean	C_1	C_2	C_3	Mean
1*	9.6	6.67	5.26	7.18	5.0	5.3	5.0	5.1
2*	2.7	1.4	2.7	2.27	1.8	1.2	1.6	1.5
3	0.4	0.42		0.41	1.0	1.0	0.8	0.9
4	13.3	11.4	9.0	11.2	20.0	16.0	20.0	18.67
5		1.2	0.5	0.85	1.26	1.2	0.6	1.02
6			3.06	3.06	4.5	1.8	3.16	3.15
7*	3.8	5.4	4.7	4.6	3.6	5.7	3.0	4.1
8*	6.67	7.6	9.26	7.8	5.7		5.7	5.7
9*	1.0	0	5.8	2.27	2.4	2.8	1.2	2.13

*Indicates subjects who increased their mean rates of correct number matching in experimental conditions

experimental conditions, while three subjects remained fairly consistent in response rates across conditions. One subject maintained a stable response pattern during control sessions, but during experimental conditions his response rates were variable, from a rate of 1 the first session, 0 the second session (he refused to work and remained distracted), to a rate of 5.8, his highest of all, in the last experimental session. However, because of such variability in responses, his mean rates for both experimental and control conditions were very close (E = 2.27, C = 2.18).

The rate decreases, for Group P, were equally as notable as the increases, although only two subjects demonstrated the trend. Each subject represented the extreme rates, both high and low, in the group. Subject 3 had the lowest correct response rate of 1, 1, and 0.8 under control conditions, but he even decreased that rate by more than half to 0.4 and 0.42 in the two experimental sessions he attended. Subject 4, who had the highest rates and always matched all 20 numbers in the fastest time, went from a rate of 20, 16, and 20 in control sessions to 13.3, 11.4, and 9 in experimental sessions. The remaining three subjects showed little variation in their response rates over either control or experimental conditions.

The younger group of subjects (Group C) showed a more consistent pattern of response rates as a group. In general, the trend was for most Group C subjects to increase their rates of correct response in the control sessions,

which occurred for them after the experimental sessions. Only one subject, number 7, had a consistently higher response rate during experimental conditions, but it was quite a minimal difference (1, 1.4, 1 to 0.67 and 0.75, with one absence during the last control session). One other subject (6), who only attended two experimental and two control sessions, showed an initial variability from 1 to 6.67 (experimental); he then missed two sessions, and during the second control session his rate was 5. Most rates for most of the subjects in Group C remained consistent, with a very slight increase in rates during control conditions, the fourth, fifth, and sixth sessions.

Differences in raw data for number correctly matched per session (see Tables 9 and 10) were so minimal for most subjects that little effect can be ascertained, particularly with Group C (Table 9). Subjects 1, 4, and in one instance subject 6, showed much variation in the number correctly matched. In Group P (Table 10), the number correctly matched for seven out of the nine subjects remained quite consistent across all sessions. Two subjects (6 and 9) showed considerable variability in the number of correctly-matched numerals, although the mean number matched for both conditions for both subjects 6 and 9 was similar.

Increases in numbers matched correctly and rates of matching over the course of the six test sessions of the study were evident, although increases were generally slight for three out of nine subjects in the older group (P), and

TABLE 9
GROUP C NUMBER CORRECT/MINUTES

Subject	E_1	E_2	E_3	C_1	C_2	C_3
1	7/5:00	11/5:00		7/5:00	7/5:00	14/5:00
2			10/5:00	11/5:00		14/5:00
3	5/5:00	0/5:00	4/5:00	7/5:00	5/5:00	7/5:00
4		4/3:00	11/5:00	6/4:00		13/4:00
5	0/4:00	0/2:00	1/3:00	1/3:00		1/2:00
6	5/5:00	20/3:00			20/4:00	
7	5/5:00	7/5:00	3/3:00	2/3:00	3/4:00	
8	7/5:00	13/5:00	8/5:00	10/5:00	13/5:00	

TABLE 10
GROUP P NUMBER CORRECT/MINUTES

Subject	E_1	E_2	E_3	C_1	C_2	C_3
1	20/2:05	20/3:00	20/3:50	20/4:00	20/3:45	20/4:00
2	13/4:45	7/5:00	12/4:25	9/5:00	6/5:00	8/5:00
3	2/5:00	2/4:45		5/5:00	5/5:00	4/5:00
4	20/1:30	20/1:45	18/2:00	20/1:00	20/1:15	20/1:00
5		6/5:00	1/2:00	6/4:45	6/5:00	3/5:00
6			13/4:15	18/4:00	9/5:00	15/4:45
7	17/4:30	19/3:30	20/4:15	18/5:00	20/3:30	15/5:00
8	20/3:00	19/2:30	20/2:10	20/3:30		20/3:30
9	5/5:00	0/5:00	16/2:45	12/5:00	14/5:00	6/5:00

seven out of eight subjects in the younger group (C). The most notable differences in the raw data (see Table 10) occurred in Group P, subject 3 and particularly subject 4 for rate decreases, and in subjects 1, 2, and 8 for rate increases.

Teacher Questionnaire

The four teachers and aides who assisted as raters in the study were given a questionnaire to complete after the study was concluded. The purpose of the questionnaire was to assess teaching staff evaluation of the procedure investigated, and to determine potential value of classroom use of music-facilitated rest from the teacher point of view. Each of the six questions is stated, followed by a summary of the responses.

1. Do you feel your students, on the whole, were quieter, calmer, and/or more relaxed during the music or during the quiet time following the story?

Both teacher and aide in Group P, the older students' class, said students were more relaxed during the music. However, the teacher and aide in Group C, the younger students' class, indicated that students were quieter during the quiet time without music.

2. Do you feel your students derived benefit affectively or attitudinally from this relaxation experience?

Three respondents said no; however, the teacher of Group P elaborated. She felt that if the experience had continued for a longer period the students may have learned to control themselves, with more teacher intervention.

3. Do you feel the music sessions helped improve students' behavior?

All four teachers and aides responded in the negative, with the teacher of Group P qualifying her no response. She felt the music sessions would need to be done more consistently, and over a longer period of time for the students' behavior to show improvement.

4. Would you be inclined to include similar music/ relaxation experiences in your curriculum, as a preparation for student learning activities, based on their response to this experience?

Both aides answered no to this question. The teacher of Group C stated that she does have music playing during the rest period after lunch. The Group P teacher indicated yes, elaborating that even though the students were not totally quiet and still, they did attend well to the task afterwards.

5. As a teacher, what was your personal reaction to the music experience?

The two aides stated that the music was relaxing, and the teacher of Group C said she enjoyed it and it made her sleepy. Group P teacher enjoyed the experience and felt

that the music relaxation could be beneficial in calming the students and preparing them to attend to a task.

6. Please suggest any recommendations for a project such as this in the future.

The teacher and aide in Group P responded that the students should be more separated so they would each have their own space. The teacher noted that there was too much interaction between the students which prevented them from getting the full effect of the music and quiet time.

Generally, the teachers were more responsive and elaborated somewhat in their answers to the questions. The teacher of the older and more active students felt the study yielded more favorable results for the classroom than the other teacher or aides.

Inferential Statistics

Inferential statistics were applied to analyze the data for number matching, the dependent variable. Differences in raw data rates (see Tables 9 and 10) were negligible; however, to test the null hypothesis *t*-tests were applied to compare responses under experimental and control conditions with both groups. The *t*-tests for paired samples were computed, comparing rates of correct number matching for all subjects. Rates for the first experimental and first control sessions, the second experimental and second control sessions, and the third experimental and third control sessions were compared for both groups (see Tables 11 and 12).

TABLE 11
GROUP C EXPERIMENTAL AND CONTROL COMPARISONS OF MEANS OF CORRECTLY MATCHED NUMBERS

	N	Mean	Difference	*t* value	df	*p*
E_1	5	0.96	-0.19	-1.19	4	0.30
C_1		1.15				
E_2	5	2.57	0.42	0.95	4	0.39
C_2		2.15				
E_3	4	1.33	-0.66	-3.69	3	0.04*
C_3		1.99				

$p \leq .05$

TABLE 12
GROUP P EXPERIMENTAL AND CONTROL COMPARISONS OF MEANS OF CORRECTLY MATCHED NUMBERS

	N	Mean	Difference	*t* value	df	*p*
E_1	7	5.35	-0.29	-0.23	6	0.83
C_1		5.64				
E_2	7	3.78	-0.96	-1.24	6	0.26
C_2		4.74				
E_3	8	5.04	0	0	7	1.00
C_3		5.03				

On the basis of the t-test results the null hypothesis was accepted.

Out of six comparisons, four yielded negative t-values, and one a t-value of 0. The t-value for the comparison between the third experimental and third control responses for Group C was significant; however, it was significant for the change from experimental to control conditions, indicating increased rates under the non-treatment condition. All students showed an increase in rate during the control session for the third comparison, although only four out of seven subjects were in attendance the third session of each condition.

Because of subject absences on a daily basis there were missing values, consequently all responses of all subjects were not analyzed. If a subject was absent during one of the experimental or control sessions, his/her rates for the corresponding session were excluded because there was no rate for comparison between the conditions.

Summary

During the music-rest treatment condition students in both groups exhibited less verbal and motor behavior than during the control rest condition. The decrease was more pronounced in the older, more active group (P).

More students overall decreased response rates to the number-matching task under experimental than under control conditions; however, this trend was more evident in Group

C, where six out of seven students responded with higher rates during control conditions. A total of four students increased rates during experimental conditions, three students remained about the same across both conditions, and two students, both in Group P, decreased rates in experimental conditions. Generally, Group C demonstrated fairly consistent rate increases over control conditions, while Group P exhibited more variability in response patterns.

In response to the teacher questionnaire, only one teacher out of the four indicated a favorable, positive reaction to the procedures of the study, based on the students' responses and behaviors. The same teacher (Group P) also offered clarification of yes/no responses on the questionnaire.

Statistical analysis comparing number-matching rates for experimental and control conditions was accomplished with the paired *t*-test for non-independent samples. Results of the analysis were not significant, except for the comparison between E3 and C3 for Group C, which showed significantly lower rates under experimental conditions. The passive music appears not to have facilitated subsequent performance on the number-matching task with these students. Interpretation and discussion of the findings are presented in Chapter 5.

CHAPTER 5
DISCUSSION AND CONCLUSIONS

The fifth chapter begins with a summary review of the study and implications. The chapter is concluded with suggestions for further research.

Review of the Study

Purpose and Objectives

The purpose of the study was to examine the relationship between a passive music-listening activity, designed to facilitate concentration and relaxation, and subsequent performance of a specific classroom task, matching numbers. The objective of the study was to determine whether passive music listening would improve subsequent task performance of trainable mentally retarded (TMR) students in the classroom setting.

Literature Summary

Due to the nearly absolute lack of research on subsequent effects of music listening, most of the literature reviewed addressed the effects of background music on activity level and/or task performance. Studies with mentally retarded populations indicated that faster, more stimulative music may reduce high rates of behavior or activity level,

while sedative or slower music can decrease or increase activity level or rates of behavior, depending on the subjects' average rates of activity during non-music conditions. Hyperactive boys in an art class increased behavior and activity rates during a taped ascending music-progression cycle; however, they continued to increase their activity after the music ended. No controls were employed, thus the results may not have been due to the music.

Classical, calming, or even march music are not ordinarily listened to by the retarded in institutions. Three out of four studies concluded that when such music was presented as background without disruption, task accuracy and performance were facilitated. Performance of subjects after the music presentation was not observed or measured. Music of high preference with hyperactive boys resulted in greater improved math performance for three of the four subjects over three other conditions, although all of the conditions tested resulted in better math performance when compared with the regular classroom.

Additional research on background music utilized non-exceptional populations. Young children were demonstrated to have differential galvanic skin responses (GSR) to exciting and calming music; young childrens' activity rates were also found to increase with faster music. Two studies resulted in no difference in task performance between music and no-music conditions. Rock n' roll music resulted in lowest performance of learning nonsense syllables in college

students in one study, while in another study college students increased exam scores and showed better physiological response of the heart under conditions of both rock and roll and classical music. Subjects taking an exam under background music conditions maintained normal blood pressure and pulse rate levels while subjects taking an exam under normal conditions increased both.

Aversive noise resulted in negative aftereffects, including impairment of task performance, negative effects on interpersonal interactions, and lower frustration tolerance. Sedative music, on the other hand, resulted in subjects' improved performance of a maze tracing speed test after the music listening.

Relaxation training has been studied with hyperactive boys in classroom and home settings, although results have not been entirely conclusive in support of the benefits of relaxation. A relaxation training program prior to a handwriting task resulted in significant improvements in that skill in boys in special classes, over the course of the school year.

The S.A.L.T. method, which utilizes relaxation and music, has been effective in improving math and reading skills in learning-disabled and remedial children, as reported in two studies. Music is part of the total method; learning takes place while relaxation with music is achieved.

Finally, the contingent use of music as a positive reinforcer or reward has been effective in increasing

production rates, correct responses, and targeted behaviors in mentally retarded subjects. Only 2 out of 10 studies reviewed did not have significant differences in the dependent variable when the music contingency was applied. The two studies having results of no difference with a music contingency utilized profoundly mentally retarded populations as subjects.

Research has demonstrated the general effectiveness of music, presented for listening, as a reinforcer for various behaviors and skills with the mentally retarded, and the potential utility of relaxation training to improve behavioral and academic performance at school and in the home with hyperactive boys. For remediation of math and reading the S.A.L.T. method, with its combination of relaxation and music, appears to be effective and readily applicable to the learning disabilities and remedial classroom settings. None of these categories of research have examined aftereffects of music on performance or individual behaviors.

Hypothesis

The null hypothesis tested in the study follows.

Ho: There will be no significant differences in task performance of matching numbers, as expressed in rate of correct responses, between TMR students receiving a story-passive music listening and a story-quiet resting time immediately prior to the task.

Summary of Method

Seventeen TMR students, 6 to 11 years of age, in two primary classes served as subjects in the study. The balanced replication design allowed for both groups to receive treatment and control conditions over a 2-week, 6-session, period. Group P (the older students) received the control condition over the first three sessions, while Group C (the younger students) received the experimental treatment. Conditions were reversed for both classes in sessions four through six.

Experimental conditions consisted of a brief taped story (1 minute 45 seconds) illustrated on the felt board, a 5 minute 26 second rest period paired with a relaxing music selection, and 5 minutes of individual number matching at the subjects' seats. Control conditions were identical except the music was deleted so the rest period occurred without any music stimulus provided.

The music used was a South American piece played on a solo Paraguayan harp. The composition is a guarania, a type of ballad in waltz tempo; the recording is 5 minutes and 26 seconds in duration.

The dependent variable for the study was matching numbers from 1 to 20. Measurement was in rate of correct response within a 5-minute independent work period occurring immediately after the rest period. Additionally, teacher and aide reactions to the study were obtained via a questionnaire given to them at the conclusion of the study.

Relaxation effects of the musical selection were also assessed by the observation and recording of subjects' behaviors during music-rest and rest without music sessions.

Discussion and Implications

Results of the study, across five of the six comparisons were not significant in relation to the stated objective. The one significant change in number-matching rates was obtained for the younger group (C) of subjects between the last experimental and last control sessions; the group received experimental sessions first and control sessions last. However, the difference in rate was significant for an increase during the control sessions, not the experimental session. Of the subjects who attended those two sessions and had scores to compare, all four of them showed a definite increase from the experimental to the control session, which was an increase over time. Similarly, five out of nine subjects in the older group (P) showed increases in rates of correct response over time, the lower rates occurring during the control phases, sessions 1, 2, and 3, and the increased rates occurring during the experimental phase, sessions 4, 5, and 6.

In the writer's opinion, these data reflect practice effect, and perhaps some maturation may have taken place to affect the outcomes. After six sessions of practice on the same task, subjects tended to show increased rates of

correct response, especially the younger subjects, which should not be an entirely unexpected phenomenon.

In the studies of Glass and Singer (1972), Donnerstein and Wilson (1976), and Borling (1981) measurement of noise aftereffects and sedative music effects on subsequent behavior and/or task performance was taken one time for subjects, without repeating the same procedure for multiple comparative measures. Borling's measure of performance after music listening required subjects to perform one task which was well within their mental capabilities. The situation in the present study of measuring performance on the same task after each of six rest and rest-with-music periods provided for practice, and very likely allowed for further skill development in the TMRs regardless of their previous activity. Practice, or rehearsal, appears to have had an effect on the subjects of the present study.

Individual, non-significant differences were noted in the raw score means between experimental and control sessions for five Group P (older) subjects. Two of these students increased rates in experimental sessions by more than one point. Although the paired comparisons were not significant, the differences are noteworthy. Subject 1 nearly doubled his rate of response between Control (C) session 1 and Experimental (E) session 1, but increases declined over the second and third C and E sessions. Subject 8 showed a very similar substantial increase. Responses during sessions C1 and C3 were constant; however, during E sessions the rates

steadily increased over each session, with the highest rate occurring in the last session, which was session 6. Subjects 1 and 8 had mastery of the skill and could match all numbers from 1 through 20.

For both subjects 1 and 8 the music could have provided the relaxation which may have contributed to improve concentration and task performance, as Borling (1981) found with his college students performing the mental and manual task of taking a maze tracing speed test. It is particularly interesting that these two subjects generally paralleled the performance of Borling's subjects, while the present subjects with lesser skill, or lack of complete skill achievement, did not respond in the same manner.

However, the subject with the fastest rate (4, Group P), who also had complete mastery of the skill of number matching, maintained his fast rate (mean 18.67) during control sessions but dropped considerably, to a mean of 11.2, during experimental conditions, a drop of 7.49. His drop in rate is interesting, as it occurred over time, and in fact declined by an average of 2 over each experimental session. Consideration of his reaction poses some questions. In the opinion of this writer, he may have been distracted by the music and therefore less able to focus his attention afterwards; i.e., the music may have had an aversive aftereffect much like noise as in Donnerstein's and Wilson's and Glass' and Singer's studies and served to impair the subject's subsequent task performance. Another possibility is that

the subject may simply have become bored with the task and may have been ready for something more challenging.

All three of the older subjects discussed were generally more mature in chronological age and in behavior than the other subjects, and had mastery of the task measured. Perhaps some key considerations in the study of aftereffects of exposure to sedative music may lie in the maturity of the subjects, the level of mastery of the skill tested, and even the relative challenge of the testing task itself. In active learning, when skills are in a developing process, performance quality and quantity may necessarily be limited by the lack of mastery, whereas with more thorough understanding of a skill rehearsal allows for development of efficiency and accuracy in performance. Music, as a prior condition with the TMR, may only be effective in assisting rehearsal, if in fact it is effective at all when listened to as a preparation for work with the TMR population.

Relaxing effects of the music selection were validated by the Behavior Tally data, which indicated significantly fewer motor and verbal behaviors for Group P, but slight and nonsignificant decreases in behavior for Group C, under music than under no-music rest conditions. Magnitude and duration of behavior/activity were not measured; however, the music selection seemed to moderate both high and low levels of activity, as Stevens' (1971) moderate tempo music mediated rocking behavior in the severely retarded. The

harp selection for the present study was soothing and relaxing, but moved at a moderate tempo as well (MM84-MM88).

Generally, the teacher and aide of the older, more active group of students (Group P) felt the music was more helpful than the teacher and aide of the younger students (Group C) did. Although student behavior was not entirely curbed during the music listening it was lessened overall, and the most active students not only exhibited fewer verbal and motor behaviors but the magnitude of those behaviors, as observed subjectively, was much less than during the control rest sessions without music. The teacher felt the difference in behavior under rest with music compared to rest without music was impressive, and therefore she was inclined to include sedative music in the classroom curriculum. In the younger class, the teacher and aide indicated greater amounts of activity during rest time with music than rest time without music in their class (although the Behavior Tally raw data did not verify that observation). Possibly the students exhibited less behavior but it was of greater magnitude and duration than in sessions without music.

Literature on background music has demonstrated that music can decrease or increase activity rates in the retarded and in hyperactive children, although the same type of music does not affect all children in the same way (Reardon & Bell, 1970; Stevens, 1971; Tierney et al., 1978; Scott, 1970; Windwer, 1980). Increased activity rates in young children have been documented in the

literature when children were provided with stimulating background music (Rieber, 1965). Although the music selection used in the study was considered relaxing by adults, and observed to be relaxing to the students (particularly the older ones), it could have been stimulating to some of the students, as Stevens (1971) has indicated that mentally retarded subjects with low rates of behavior decrease behavior rates with faster tempo music. Reardon and Bell (1970) observed a trend toward lower activity levels in the severely retarded during stimulative rather than sedative music. However, Tierney et al. (1978) found an overall increase in movement behavior, again in severely retarded subjects, with stimulative background music. It appears that the presence of a musical stimulus affects the general activity level of the mentally retarded, although not in a consistent manner across studies. In the case of the younger students the music may have been stimulating more activity, as perceived by the teacher and aide when comparing music and non-music rest periods.

Problems and Limitations

There were a number of problems and limitations that were encountered in the process of implementing this research study which should be considered when interpreting these data. First, all subjects did not have complete skill mastery of the dependent variable, matching numbers from 1 to 20. The lack of mastery on the part of several subjects,

particularly the younger ones, may have contributed to the slight increases in rates of response over the time of the study, regardless of the experimental or control conditions. The problem could have been alleviated by more closely matching subjects in age and maturity, and in level of skill mastery.

Another problem that may have affected the students' behaviors and responses was both student and teacher absenteeism. Student rates could not be compared for missed sessions, and there was considerable absenteeism in the younger group of subjects over the course of the study. One of the teachers (Group P) was ill during the second and third control sessions for her class, and was substituted with a different person both of those days. Teaching style of the substitutes had an impact on student behavior, and the substitutes' lack of knowledge of the study made data collection of behaviors during the rest phase cumbersome for the aide and experimenter present. The problem could have been overcome by conducting the study on a one-time basis in two equivalent classrooms, or by randomly selecting subjects and removing them from the classroom for treatment and testing.

Counting behaviors during the rest phases presented some problems. There was no clear, concise definition for what constituted a single motor or verbal response; consequently when subjects verbalized several phrases consecutively and/or moved their bodies or body parts in some sort of sequence

consisting of many movements, the resulting behavior count became very subjective. Rater reliability was jeopardized under those conditions. The problem could have been averted by using a time-sampling method for duration of activity rather than counts of specific behaviors; some mechanism for measuring the magnitude of activity, such as using a sound level meter, would have resulted in a more specific assessment of behavior and activity level.

Subjects in Group C tended to be more readily distracted during number matching and frequently went off-task well before they had matched to their baseline level, and before the 5-minute time limit ended. The young ages and lack of maturity of Group C subjects, plus the shorter attention spans, may have interfered in their performance of the number-matching task. The problem would have been better controlled by choosing a lower level of task which all the younger subjects had mastered and/or by setting a shorter time limit than the five minutes for task completion, or by using a population of subjects the same, or nearly the same, age as the older class.

Finally, it was noted that the more active subjects, particularly in the older class, sought out interaction with one another during the rest phases of both experimental and control conditions. The level of subjects' activity seemed to increase with their proximity to one another. The most active students should have been widely separated from one another in the classroom for maximum relaxation effect.

Practical Implications

There were a number of findings derived from the study which may have practical implications for others involved in research or applied practice in the area. Classroom teachers of the TMR may find the addition of sedative music to the students' normal rest period during the day to be facilitative of relaxation and rest. Teachers may choose to explore different types of music for listening that may enhance student benefits of passive class times. By preceding a skill rehearsal session with appropriately calming music and passive rest, teachers may help facilitate student performance of those skills that are already learned yet present interest or challenge to the student, and that can be executed more efficiently and accurately with practice.

Other individuals involved in some capacity with the TMR, such as speech, occupational, or physical therapists may find music-facilitated relaxation useful in the accomplishment of their therapeutic goals for these students. Researchers in special education, and in music therapy, may want to pursue a similar line of investigation regarding the effects of sedative music and relaxation on subsequent task performance. The potential of passive music listening as a preparation for individual performance on mental and/or manual tasks has just begun to be researched and is worth continued study. The practicality of providing recorded sedative music to TMR students in the classroom setting, as part of the curriculum of daily activities allows for ready

implementation. Sessions of music listening can be incorporated by teachers without expense, as most classrooms have the equipment and materials necessary for such an activity.

Suggestions for Further Research

Results of the present study were generally inconclusive; however, it is suggested that further study be done. Borling (1981) found significant improvement in task performance in his college student subjects after they listened to sedative music, while the present study, overall, did not. The differences suggest that the subject population may need to be completely accomplished in the task measured, rather than in some stage of skill development, as the TMR population was. The variable of age and maturity of subjects may also be important to the results. The TMRs were all under 12 years of age and necessarily quite immature, with varying levels of activity and attention span. Therefore, effects of sedative music on subsequent task performance may be a varying individual response which cannot easily be assessed in classes of young TMR individuals, at least not with the music and measures utilized in the present study.

In future research on the effects of relaxing, sedative music on subsequent task performance, the population should be carefully considered. It is recommended that a class of non-exceptional elementary level students be subjects in a study of similar design, and tested on a skill which is already accomplished in the entire class, such as

addition or spelling. Another suggestion would be to take individual exceptional or non-exceptional students and measure them on similar (academic) tasks as above using a single case design with reversals, over a short period of time, to compare their responses (viz., rates of accuracy) over both music and non-music conditions.

Since the practicality of using music in the classroom as a preliminary or preparatory activity to academic or other task performance is the issue in question, it might be beneficial for the teacher to ascertain whether a student might respond to such a program by trying it out. If a student responds well, or if general group behavior in the classroom is moderated, then sedative music used as a preparation for work would be warranted as part of the classroom curriculum.

APPENDIX A
TRAINABLE MENTALLY RETARDED (TMR) CRITERIA

According to the criteria of the School Board of Alachua County, Florida, the TMR:

1. Is of school age;

2. Has a measured level of intellectual functioning, as determined by performance on an individual test of intelligence, that falls between three and five standard deviations below the mean. The profile of intellectual functioning shows consistent sub-average performance in a majority of areas evaluated;

3. Has an assessed level of adaptive behavior below age and cultural expectations; and

4. Demonstrates sub-average performance on a standardized measure of academic achievement.

APPENDIX B
PRETEST DATA

GROUP C BASELINE PRETEST DATA FOR NUMBER MATCHING

Subject	Number Correct	Total Possible
1	10	20
2	7	20
3	5	20
4	20	20
5	5	20
6	20	20
7	10	20
8	14	20

GROUP P BASELINE PRETEST DATA FOR NUMBER MATCHING

Subject	Number Correct	Total Possible
1	19	20
2	8	20
3	9	20
4	16	20
5	11	20
6	13	20
7	16	20
8	20	20
9	11	20

APPENDIX C
PARENTAL INFORMED CONSENT

I, Michele Gregoire, am a graduate student in the Department of Special Education at the University of Florida, and would like the participation of your child in a study I am conducting.

The study involves how well students do their school work after listening to music. Nothing outside of ordinary school work will be done; your child will be participating in regular classroom activities.

The information obtained will be kept confidential to the extent provided by law. There is no risk or discomfort expected, and there will be no monetary compensation awarded. You have the right to withdraw consent for your child to participate at any time prior to the end of the project.

If you have any questions about this study please contact me at home, 376-1187. I will be happy to discuss it with you.

I have read and understand the procedure described above, and agree to allow my child _____ to participate in the project, and I have received a copy of this description.

_____ _____
Parent or Guardian Date

Principal Investigator

Michele Gregoire
P.O. Box 1424
Gainesville, Florida 32602
376-1187

APPENDIX D
TEACHER RATING QUESTIONNAIRE

1. Do you feel your students, on the whole, were quieter, calmer, and/or more relaxed during the music or during the quiet time following the story?

2. Do you feel your students derived benefit affectively or attitudinally from this relaxation experience?

3. Do you feel the music sessions helped improve students' behavior?

4. Would you be inclined to include similar music/relaxation experiences to your curriculum, as a preparation for students' learning activities, based on their response to this experience?

5. As a teacher, what was <u>your</u> personal reaction to the music experience?

6. Please suggest any recommendations for a project such as this in the future.

APPENDIX E
BEHAVIOR TALLY FORM

Student:_____ Session: E 1 2 3 C 1 2 3

Date:_____ Indicate each occurrence of behavior with a hatch / .

Vocal/Verbal	Movement
Comments:	

Types of behaviors to chart:

Vocal/Verbal -
vocal sounds, whimpers, moans, cries, laughing, whispering, talking, conversation, mouth sounds, any vocal/verbal sounds incompatible with relaxation

Movement -
touches others, fidgets, sits up, stands up, walks about, kicks, moves arms, rolls over, turns head, any movement incompatible with relaxation

APPENDIX F
STORY SCRIPT

Once there was a wonderful harp player named Alfredo, who delighted in playing his beautiful music for all the children. The music was soft, and quiet, and gentle, and rocked the children into a quiet, sleepy feeling. When he began to play everybody closed their eyes and breathed in very deeply and very slowly, then let their breath out very slowly. This they would do as strains of the lovely harp music lulled them into a feeling of relaxed comfort. They felt so good!

Alfredo's harp was a musical instrument made of wood, with nylon strings, and it sounded something like a guitar. Alfredo was a gentle lovely man who loved all the little children. He played his music so they would be happy and comfortable, and rested, between their work times at school, between play times at home, and even before they went to bed at night. He loved those children so, and his music would tell them that, without even any words, so lovely and expressive it was!

You can almost hear his music. Just lie down, and close your eyes, and you can rest too. Rest awhile now. Be still; do not talk, and do not move around. Now, rest, everyone. . . rest.

APPENDIX G
RAW DATA FOR BEHAVIORS

GROUP C COMBINED MOTOR AND VERBAL BEHAVIOR
RAW DATA BY SESSION

Subject	E_1	E_2	E_3	C_1	C_2	C_3
1	5	5		4	6	3
2			4	3		5
3	3	2	1	2	11	4
4		3	12	3		7
5	16	7	10	6		18
6	14	5			14	
7	4	2	6	9	19	
8	8	8	1	12	5	

GROUP P COMBINED MOTOR AND VERBAL BEHAVIOR
RAW DATA BY SESSION

Subject	C_1	C_2	C_3	E_1	E_2	E_3
1	4	2	7	7	16	8
2	20	25	12	17	18	26
3	12	34	13	11	25	
4	16	17	14	20	3	4
5	56	31	15		40	21
6	28	23	10			5
7	32	27	8	10	10	8
8	24		8	7	18	17
9	76	27	28	28	45	23

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BIOGRAPHICAL SKETCH

Michele Arlene Gregoire was born on August 28, 1949, in Trumansburg, a small town near Ithaca, New York. Her family moved to Sarasota, Florida, while she was in elementary school; she graduated from Sarasota High School in 1967. From 1967 to 1968 Michele attended Manatee Junior College in Bradenton, Florida, majored in music and was active as a flutist in college performing ensembles. In 1969 she transferred to Florida State University in Tallahassee and completed a Bachelor of Music degree in music therapy there in 1971. Her Master of Arts degree in music was received from California State University in Long Beach in 1974; doctoral study in special education began in 1978 at the University of Florida in Gainesville and was completed in 1983.

Michele worked for 10 years as a music therapist with the mentally retarded, cerebral palsied, and physically- and multi-handicapped in state institutions in Costa Mesa, California (1971-1976) and in Gainesville, Florida (1977-1981). She was the coordinator of music therapy internship programs both in California and in Florida. In addition to clinical and teaching experience with the developmentally disabled, she also taught in-service education courses in special education modalities to facility staff while in

California, with credit given through California State University-Fullerton; later she taught music therapy courses in the extension program at the University of California-Los Angeles.

Throughout her career Michele has been, and still remains, active in professional organizations. She has served as president, editor of the newsletter, and delegate of the Western Region of the National Association for Music Therapy (NAMT), and as a delegate of the Southeastern Conference of NAMT.

Most recently Michele has worked at the University of Florida laboratory school (P.K. Yonge) in the Community Talents Project for elementary students, has taught in the Music Department at the University of Florida, and has performed with the Florida Flute Club.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Cary L. Reichard, Chairman
Associate Professor of Special Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robert F. Algozzine
Professor of Special Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Phyllis E. Dorman
Professor of Music Education

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Cecil D. Mercer
Professor of Special Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

William R. Reid
Professor of Special Education

This dissertation was submitted to the Graduate Faculty of the Department of Special Education in the College of Education and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

April 1983

Dean for Graduate Studies and Research